Patent Claims:

1. Method to detect and measure the phase of response signals (y(t)) of a bio-system, including the following steps:

a) Multiplication of the response signal (y(t)) whose phase (y(t)) is to be determined, with a first factor;

b) Multiplication of the product obtained from Step a) by a second factor represented by a trigonometric function, whose argument results from the product of the frequency of the investigated response signal times the time, added to the measured phase, whereby the frequency of the trigonometric analysis function corresponds to the frequency at which the phase is to be determined, or that deviates from this frequency by a known amount,

c) Multiplication of the measured phase times a third factor (a);

d) Formation of a differential from the product obtained in Step b) and the product obtained in Step c);

e) Integration of the differential obtained in Step d) over time, whereby the result of this integration represents the signal's phase to be determined; and

f) Repetition of Steps a) through e) until a break-off criterion is achieved.

2. Method as in Claim 1, characterized in that the first factor is chosen to be temporally constant or alterable.

3. Method as in Claim 1 or 2, characterized in that, during the differential formation in Step d), the product from Step c) is subtracted from the product from Step b).

4. Method as in one of Claims 1 through 3, characterized in that the response signal (y(t)) is directed to a status observer that performs the method steps a) through f) in order to determine an estimated phase ($\varphi_M(t)$), whereby the method is interrupted when the observer output signal ($y_M(t)$) deviates to be less than an error value (e(t)) specified by an error function ($cov_e(t)$) from the response signal (y(t)) and whereby, after interruption of the method, the estimated phase ($\varphi_M(t)$) is set to be equal to the phase ($\varphi(t)$) of the response signal.

5. Method as in Claim 4, characterized in that the Steps a) through d) are performed within the observer according to the following formula:

$$\dot{\varphi}_M = -a \bullet \varphi_M(t) + \mathrm{cov}_e(t) \bullet \hat{y} \bullet \cos(\omega t + \varphi_M(t)) \bullet y(t) \bullet R_p^{-1}(t) .$$

6. Arrangement to detect and measure the phase of response signals of a bio-system, characterized in that the arrangement includes a status observer in parallel to the bio-system into which the response signal of the investigated system is inserted, and that performs the method steps as in one of Claims 1 through 5.

7. Arrangement as in Claim 6, characterized in that the status observer includes a Kalman filter with which interfering signals may be filtered out of the response signal.